

Drastic cutaneous multi-focal orf infection in goats, causing severe dysfunctioning

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Summary

A flock of 76 goats was struck by orf infection at the Al-Ahsa oasis in eastern Saudi Arabia. The morbidity rate was 89%, while the case fatality rate was 3%. The clinical signs were most severe in three adult goats, which survived, and in two kids, which died of the infection. The lesions were multi-focal and so serious that they prevented the infected goats from seeing, eating, lactating or walking. The virus was isolated in Vero cell culture and a scab suspension was used to experimentally infect susceptible goats. These newly infected animals suffered only mild disease but the orf virus was re-isolated and the goats seroconverted. To the best knowledge of the authors, these were the most drastic orf lesions seen during the last 17 years in goats in Saudi Arabia.

Keywords

Caprines – Drastic – Dysfunction – Goats – Middle East – Multi-focal – Orf – Saudi Arabia – Small ruminants.

Introduction

Orf infection in goats can be clinically manifested as simple lesions around the commissures of the mouth. These lesions usually begin as erythema, followed by papules/pustules, which develop into brownish dry scabs. The time span of these stages is usually four to six weeks. Under certain circumstances, e.g. in young malnourished kids, the disease may take a chronic form, which might take more than six months to heal completely. In such chronic cases, the lesions can spread to other parts of the skin (1, 2). However, the severity of the disease observed in the goats of the 2003 outbreak at Al-Ahsa has not been recorded in Saudi Arabia before. In this article, the authors report the results of the investigation into this outbreak and discuss their implications.

Materials and methods

History of the disease

In April 2003, an outbreak of severe skin disease affected a flock of 76 Ardy (a local Saudi breed of goats) at Al-Ahsa

oasis in eastern Saudi Arabia (25° 23' N; 40° 51' E). The affected goats were of different age groups and both male and female. The flock was kept in the open. The morbidity rate was 89%, while the case fatality rate was 3%. The deaths involved young kids only. Five goats presented with multi-focal drastic scab lesions that involved the lips and were found on and around the eyes (Fig. 1) and the fetlock and, in adult goats, covered the entirety of the teats and part of the udder. The lip lesions prevented the affected goats from opening their mouths freely. This led to anorexia and a loss in weight. The goats with the leg lesions (Fig. 2) showed lameness; some were unable to walk and became recumbent. The lesions covering the teats (Fig. 3) occluded the teat orifice and prevented the kids from getting milk. The severely affected kids were not related to any of the severely affected adult goats.

On examining the affected goats, the mean rectal temperature was 40.3°C. The scab lesions on the eyes, lips and legs were typical of orf. However, those on the teats were wart-like. The less severely affected animals were able to clear the infection in the timescale normally associated with an orf virus infection (i.e. four to six weeks) (4).



Fig. 1
An orf-infected adult goat, showing lesions that completely cover the eyes, to such an extent that the animal can no longer see

Lesions can also be seen on the lips and around the mouth. The lower edge of the left ear flap has been damaged by the lesions, which dropped off, leaving empty patches



Fig. 2
Severe orf lesions on the fetlock

In some cases, the lesions on the fetlock were so severe that the goats became recumbent



Fig. 3
A goat with severe orf lesions covering the lower third of the udder

These lesions completely occluded the teat orifice, causing stagnation of the milk inside the udder, eventually leading to mastitis and malnutrition in the suckling kids

The inoculum

A pool of scab material was collected from the affected goats and triturated to make a 50% suspension in sterile minimum essential medium, pH 7.4. After low centrifugation, in the cold, the supernatant fluid was collected, treated with antibiotics (5) and used to inoculate the experimental animals and for Vero cell culture monolayers.

Virus isolation and identification

The Vero cell monolayers were inoculated as described by Housawi *et al.* (4). The isolated virus was titrated in Vero cell culture monolayers and the tissue culture infective dose for 50% (TCID₅₀/ml) was calculated according to Reed & Muench (6).

The micro serum neutralisation test of Trueblood *et al.* (7) was performed in Vero cell culture monolayers to identify the isolated virus, employing a specific rabbit anti-orf hyperimmune serum, which was previously described by Housawi *et al.* (4).

Experimental infection

Twelve locally bred goats were used in the experiment. Six were of the Ardy breed and six were of the Aseeri breed. All goats tested sero-negative for antibodies against orf by indirect enzyme-linked immunosorbent assay (ELISA), as described below.

The 12 goats were divided into three groups (A, B & C). Each group consisted of two Ardy and two Aseeri goats. Each goat in group A was inoculated intradermally with the inoculum on the lips and around the mouth, as described by Housawi *et al.* (5). Group B were each inoculated intravenously with 1.5 ml of the inoculum. Group C goats (the control group) were each inoculated with phosphate buffered saline, pH 7.4. Each group was placed in separate confinement, provided with food and water *ad libitum* and observed daily for clinical signs. Each week, serum samples were collected from each goat to test for seroconversion by ELISA, as described by Housawi *et al.* (3).

The indirect enzyme-linked immunosorbent assay

The procedure for an indirect ELISA, as described by Housawi *et al.* (3), was followed to detect orf antibodies in the sera from the goats, collected weekly. An orf antigen was kindly provided by Dr P. Nettleton, of the Moredun Institute, United Kingdom, and this was employed as the ELISA antigen.

Post-mortem examination

Two of the naturally infected goats were slaughtered and a post-mortem examination (PM) was performed. The internal organs were thoroughly inspected for any lesions suggestive of orf infection.

When scabs formed on the goats in group A, a necropsy was performed on one Ardy and one Aseeri goat from each group. The internal organs were thoroughly examined for any lesions suggestive of orf.

Results

Virus isolation and identification

Inoculation of the pooled scab material onto the Vero cell culture monolayers resulted in a cytopathogenic effect (CPE), which started from day two post inoculation (p.i.) and progressed to destroy approximately 80% of the monolayers after a week. The virus titre was 10^7 TCID₅₀/ml in the Vero cells.

The isolated virus activity was completely neutralised by the rabbit anti-orf hyperimmune serum.

Experimental infection

The four goats in group A developed typical orf lesions. The lesions started as erythema on day two p.i., which developed into a papule/pustule stage on day five p.i. These dried to make a brownish/black scab within 28 days p.i. The goats in group A had a mean rise in rectal temperature of 1°C during the first week p.i. The goats in the other two groups showed no rise in rectal temperature.

The goats in groups B and C showed no clinical abnormalities until the end of the experiment, after seven weeks.

Post-mortem examination

None of the goats examined showed any internal lesions.

Discussion

In this article, the authors present the results of their field observations of a drastically severe form of orf infection in goats.

The clinical picture of the disease, together with the virological findings, confirmed that the outbreak was due to orf virus infection.

The authors have experience of some 17 years working on orf problems in Saudi Arabia. However, this was the most drastic clinical form of the disease that they had ever encountered.

In the drastically affected goats in this outbreak, the disease caused dysfunction in some of their vital physiological activities. For instance, one goat suffered from impaired vision, due to the severe lesions on the eyes. The teat orifices in two goats were occluded by the scab lesions formed on the teats. This led to malnutrition in the suckling kids and to mastitis. The fetlock region of the legs was also affected by severe lesions that led to recumbency in two of the goats.

Such a severe form of the disease can cause great economic losses. These losses could be manifested by malnutrition in the suckling kids, by mastitis in the adult goats, by the inability of goats with affected legs to walk and graze, and by the impairment of vision. The severe lesions in the mouth also interfered with eating and so the animals lost condition.

It is rather difficult to pinpoint the cause of such a severe form of the disease in this particular outbreak. As indicated in the results of the experimental infection study, the orf virus strain which caused the original outbreak did not cause the same severe clinical picture in the experimental goats of the same breed that were naturally infected. (The authors used the same field virus in their experiments without propagating it *in vitro*.) However, it can be speculated that the aggravated clinical signs seen in the severely affected goats could be due to individual immunological incompetence. In addition, it is possible that the severely affected goats were exposed to stress shortly before their exposure to the orf virus, and that this may have led to these severe conditions.

The severe multi-focal nature of the clinical manifestations in this outbreak indicated that the eyes, the udder and teats and the fetlock region can be highly vulnerable predilection sites for the orf virus; as well as the classically known sites, such as the lips and oral cavity.

The authors believe that it is high time to seek an effective orf vaccine for use in sheep and goats in Saudi Arabia.



Ecthyma contagieux cutané multifocal sévère chez des chèvres, occasionnant d'importants troubles fonctionnels

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Résumé

Une infection d'ecthyma contagieux a été signalée dans un troupeau de 76 chèvres situé dans l'oasis d'Al-Ahsa, dans l'est de l'Arabie saoudite. Le taux de morbidité s'est élevé à 89 % avec une mortalité de 3 %. Les signes cliniques ont été particulièrement graves chez trois chèvres adultes, qui ont néanmoins survécu, et chez deux chevreaux qui ont succombé à l'infection. Les lésions étaient multifocales et d'une gravité telle que les chèvres infectées étaient incapables d'ouvrir les yeux, de manger, de nourrir leurs petits ou de marcher. L'isolement du virus a été réalisé sur culture cellulaire Vero ; une suspension de tissus prélevés sur des croûtes a été utilisée pour transmettre expérimentalement l'infection à des chèvres sensibles. Ces chèvres infectées expérimentalement ont présenté des signes cliniques modérés ; néanmoins, le virus de l'ecthyma contagieux a pu être isolé chez ces animaux, qui ont développé des anticorps spécifiques. À la connaissance des auteurs, cet épisode d'ecthyma contagieux est le plus grave enregistré chez des chèvres en Arabie saoudite depuis 17 ans.

Mots-clés

Arabie saoudite – Caprin – Chèvre – Dysfonctionnement – Ecthyma contagieux – Maladie grave – Moyen-Orient – Multifocal – Petit ruminant.



Disfunciones graves en cabras debidas a una violenta infección cutánea multifocal por el virus orf

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Resumen

En el oasis de Al-Ahsa, situado en la parte oriental de Arabia Saudí, un rebaño de 76 cabras resultó infectado por el virus orf. La tasa de morbilidad fue del 89% y la de letalidad del 3%. Se observaron signos clínicos muy graves en tres cabras adultas, que sobrevivieron, y en dos cabritos, que murieron por la infección. Las lesiones, de carácter multifocal, resultaron de tal gravedad que los animales infectados no podían ver, comer, amamantar ni caminar. El virus fue aislado en un cultivo de células Vero. Por otra parte, se utilizó una suspensión de escaras para infectar experimentalmente a las cabras susceptibles, que manifestaron una forma leve de la enfermedad, aunque experimentaron seroconversión y en sus tejidos se aisló el virus de nuevo. Hasta donde saben los autores, se trata de las lesiones por virus orf más graves que se han observado en Arabia Saudí en los últimos 17 años.

Palabras clave

Arabia Saudí – Disfunción – Cabras – Caprinos – Drástico – Multifocal – Orf – Oriente Medio – Pequeños rumiantes.



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